



# HEALTH PHYSICS SOCIETY

*Specialists in Radiation Safety*

## Potassium Iodide (KI)

### HEALTH PHYSICS SOCIETY FACT SHEET

#### **What is it?**

Potassium iodide (KI) is a salt, similar to sodium chloride (NaCl), normal table salt. KI is available in pill form or dissolved in water as a supersaturated potassium iodide (SSKI) solution. The pills contain a daily adult (children's doses range from 16-65 mg depending on their size and age) dosage of 130 milligrams (mg). Several drops of the SSKI in juice or water will also provide a daily dosage of 130 mg.

#### **What is KI used for?**

The thyroid gland needs iodine to carry out its hormone production function. The gland is constantly removing iodine from the bloodstream. Iodine normally enters the bloodstream from the food we eat. For decades it has been known that 130 mg KI was enough iodine to totally satisfy an adult's thyroid gland's desire for iodine for a day or so. If 130 mg of KI is taken shortly before radioactive iodine enters the body, the thyroid gland will have already been totally satisfied and will not absorb radioactive iodine from the bloodstream. Thus, the body will eliminate the radioactive iodine, primarily by way of the urine, over a period of a week or two and the thyroid will not absorb and store the radioactive iodine. Taking KI is a method of shutting down the thyroid absorption of iodine (a process called "blocking") until the body rids itself of any radioactive iodine.

#### **Where does radioactive iodine come from?**

Radioactive iodine is a fission product, one of about 200 different radioactive atoms (radionuclides) that can be produced when uranium atoms fission or split apart upon being struck by a neutron. For example, radioactive iodine is created through the process of using nuclear reactors to supply the heat used to produce electricity or as the result of the detonation of an atomic bomb. The major isotopes of radioactive iodine produced in the fissioning process have a short half-life. Therefore, they only exist while the nuclear reactor is operating and producing electricity or for a few days following the reactor shutdown or atomic bomb detonation. It is not a concern, for example, in spent fuel from nuclear reactors.

Radioactive iodine is also made for medical purposes under controlled conditions using an accelerator.

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### **Is radioactive iodine hazardous?**

Radioactive iodine can be hazardous if we are exposed to enough of it. Radioactive iodine undergoes radioactive decay, releasing both beta and gamma rays. If we are close to radioactive iodine or if we take radioactive iodine into our bodies, our bodies will be exposed to its beta and gamma rays. If radioiodine is removed from the bloodstream and stored in the thyroid gland, the thyroid gland and the rest of the body will receive higher radiation doses than they would if the radioiodine simply passed through the body. This removal and storage can be prevented by the appropriate use of KI.

### **Are there any beneficial uses of radioactive iodine?**

Radioactive iodine has been used for the past half century for diagnostic and therapeutic purposes in medicine. In small amounts it is used to determine whether or not the thyroid gland is functioning normally. When tagged to certain pharmaceuticals, it can be used to create images of certain organs of the body. When administered in larger doses it can lower the activity of an overactive thyroid gland and cause it to function normally. In even higher doses it has been proven to be a very effective cure for thyroid cancer.

### **Is KI a “magic bullet” to be used in the event of a nuclear accident?**

There are many radioactive nuclides (atoms) that can be released to the environment in the event of a severe nuclear accident. Radioactive iodine may be one of them depending on the circumstances of the accident. For example, there was essentially no radioactive iodine released into the environment during the Three Mile Island (TMI) reactor accident while there was a large amount released from Chernobyl. KI, if taken properly and in a timely fashion, can provide some protection for one organ, the thyroid, if radioactive iodine is present in the mix of the many radioactive nuclides that may be released. It provides no protection against the rest of the radioactive nuclides that could be released or protection of any other organs.

### **Is KI a “magic bullet” to be used in the event of a “dirty bomb”?**

A “dirty bomb” is a conventional explosive device incorporating radioactive material. It is designed to produce contamination with the radioactive material and instill fear and panic in people near the explosion. It is extremely unlikely for radioiodine to be used in a “dirty bomb” due to its short half-life and low radiotoxicity compared to other radioactive materials that are more likely to be used. Therefore, KI would have no protective value from a “dirty bomb.”

### **Are there any hazardous side effects associated with taking KI?**

While there have been minimal side effects observed in large populations administered KI (such as after the Chernobyl Accident), KI is a pharmaceutical that should be taken only on the advice of health-care advisers. A small number of people have an allergic reaction to iodine, which can cause hazardous side effects in them. Since there is a possibility of side effects, national scientific organizations and the Environmental Protection Agency (EPA) have established recommendations for thyroid doses following an accident involving radioactive iodine at which

administering KI should be considered. If the potential exposure to the thyroid is below these dose levels they consider the risk from effects of radioiodine in the thyroid gland are not great enough to warrant the risk of a side effect. The current EPA recommendation for State Health Officials is to consider administering KI to the population if the thyroid has the potential to exceed a dose of 25 rem.

### **What are the effects of radioiodine in the thyroid gland?**

Radioiodine in the thyroid gland can lead to increased radiation dose to the thyroid gland and to the rest of the body. Radiation to the thyroid gland of children increases their risk of developing thyroid cancer later in life. Large amounts of radioiodine in the adult thyroid gland can lead to a reduced functioning of the gland and additional radiation dose to the rest of the body.

### **Is there an alternative to taking KI pills?**

The absolute best protection is to not get exposed to ANY unjustified radiation. This includes radiation from radioiodine and the many other radionuclides that could be released from a nuclear accident. The primary protective action in State emergency response plans is evacuation and sheltering. Administration of KI is a supplemental action when it is warranted. If advised by State Health Officials to evacuate or shelter, this should be done immediately.

### **Are we now better prepared to deal with nuclear emergencies?**

We learned a lot from the accidents at TMI and Chernobyl. This information has been incorporated into our emergency plans that are now designed to get people out of harm's way in a timely fashion and assure that they receive no or minimal radiation exposure. One of the lessons from Chernobyl, for example, is that administration of KI is an appropriate protective action when the situation warrants. In the event of any nuclear emergency, the best procedure to follow is to tune into the emergency radio and television channels and follow the advice given by those in charge of our safety in an emergency.

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The Health Physics Society is a nonprofit scientific professional organization whose mission is excellence in the science and practice of radiation safety. Since its formation in 1956, the Society has grown to approximately 6,000 scientists, physicians, engineers, lawyers, and other professionals representing academia, industry, government, national laboratories, the Department of Defense, and other organizations. Society activities include encouraging research in radiation science, developing standards, and disseminating radiation safety information. Society members are involved in understanding, evaluating, and controlling the potential risks from radiation relative to the benefits. Official position statements are prepared and adopted in accordance with standard policies and procedures of the Society. The Society may be contacted at 1313 Dolley Madison Blvd., Suite 402, McLean, VA 22101; phone: 703-790-1745; fax: 703-790-2672; email: [hps@BurkInc.com](mailto:hps@BurkInc.com).